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CA 2226186 C 2005/09/13

(11)(21) **2 226 186**

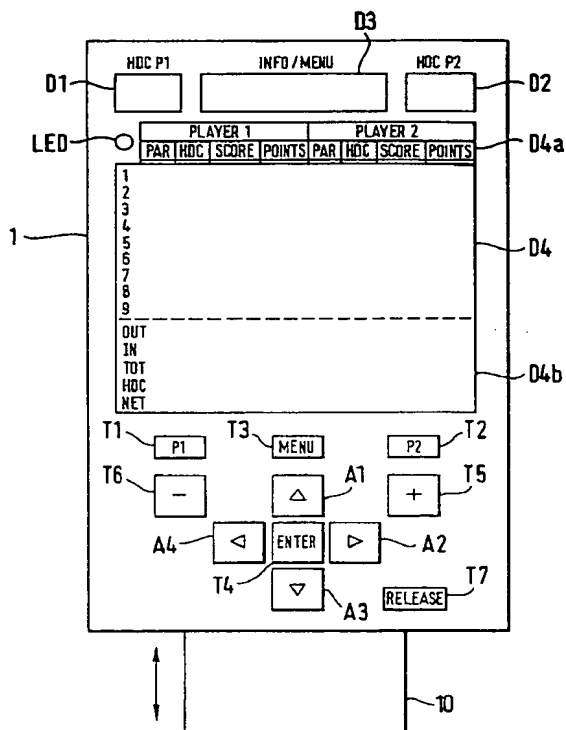
(12) **BREVET CANADIEN  
CANADIAN PATENT**

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 1996/07/05  
(87) Date publication PCT/PCT Publication Date: 1997/01/30  
(45) Date de délivrance/Issue Date: 2005/09/13  
(85) Entrée phase nationale/National Entry: 1998/01/05  
(86) N° demande PCT/PCT Application No.: NO 1996/000166  
(87) N° publication PCT/PCT Publication No.: 1997/002873  
(30) Priorité/Priority: 1995/07/10 (952730) NO

(51) Cl.Int.<sup>6</sup>/Int.Cl.<sup>6</sup> A63B 71/06  
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(54) Titre : SYSTEMES D'ENREGISTREMENT DES PERFORMANCES POUR LE GOLF  
(54) Title: GOLF PERFORMANCE SYSTEMS



PGPS

(57) Abrégé/Abstract:

A personal golf performance system PGPS comprises an electronic score card (1) with a user interface with a display device (D) and a keyboard device (T) together with a personal data module (10) preferably in the form of an electronic smart card for

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OPIC • CIPPO 191

OPIC



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(57) Abrégé(suite)/Abstract(continued):

transferring data to and from the score card (1) which is used, amongst other things, for recording the score for a golf game and calculating the adjusted handicap for the player after the completion of the game. The personal performance system PGPS together with a central golf performance system CGPS form part of a recording and monitoring system RMS for golf, assigned to a specific club or course. The central performance system CGPS comprises a data processing device (15) and is used for updating the personal performance system PGPS via the personal data module (10). The central performance system CGPS records and monitors data for the players and the game, and checks the calculated and adjusted handicaps, in addition to storing information on the course and the golf club's members. A method is specified for use of the personal performance system PGPS and the recording and monitoring system RMS.

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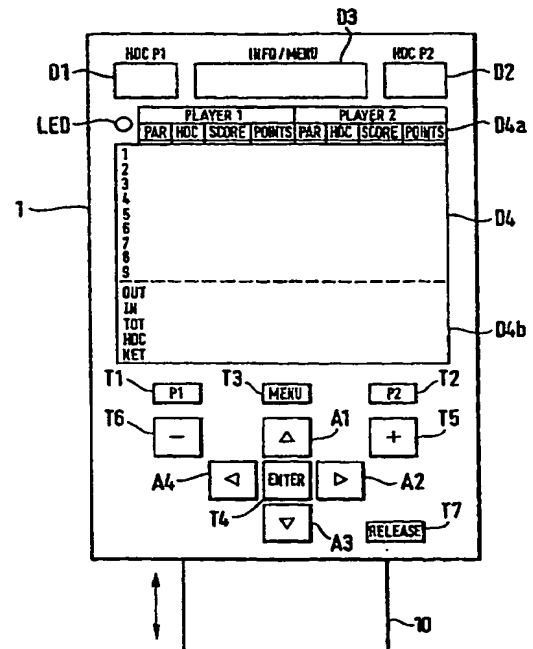
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6: <b>A63B 71/06</b>	<b>A1</b>	(11) International Publication Number: <b>WO 97/02873</b> (43) International Publication Date: 30 January 1997 (30.01.97)
(21) International Application Number: PCT/NO96/00166 (22) International Filing Date: 5 July 1996 (05.07.96) (30) Priority Data: 952730 10 July 1995 (10.07.95) NO (71)(72) Applicant and Inventor: WERGELAND, Harald [NO/NO]; Ullem Allé 131, N-0381 Oslo (NO). (74) Agent: ONSAGERS PATENTKONTOR A/S; P.O. Box 265, Sentrum, N-0103 Oslo (NO).	(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  Published With international search report.	

(54) Title: GOLF PERFORMANCE SYSTEMS

## (57) Abstract

A personal golf performance system PGPS comprises an electronic score card (1) with a user interface with a display device (D) and a keyboard device (T) together with a personal data module (10) preferably in the form of an electronic smart card for transferring data to and from the score card (1) which is used, amongst other things, for recording the score for a golf game and calculating the adjusted handicap for the player after the completion of the game. The personal performance system PGPS together with a central golf performance system CGPS form part of a recording and monitoring system RMS for golf, assigned to a specific club or course. The central performance system CGPS comprises a data processing device (15) and is used for updating the personal performance system PGPS via the personal data module (10). The central performance system CGPS records and monitors data for the players and the game, and checks the calculated and adjusted handicaps, in addition to storing information on the course and the golf club's members. A method is specified for use of the personal performance system PGPS and the recording and monitoring system RMS.

**PGPS**

## Golf Performance Systems

The invention concerns a personal golf performance system, comprising a hand-held, programmable electronic score card, wherein the score card comprises a microprocessor with arithmetic registers, a user interface with a display device and a keyboard device, together with a memory device, wherein the user interface and the memory device are connected respectively to the microprocessor via data buses, and wherein the score card further includes a power supply unit and a clock. The invention also concerns a recording and monitoring system for golf with a central performance system, wherein a personal golf performance system is employed and wherein the recording and monitoring system is assigned to a specific golf club and golf course and localized in connection with the golf course. The invention finally concerns a method in connection with a recording and monitoring system for golf with a central performance system, wherein there is employed a personal performance system comprising a hand-held, programmable electronic score card, wherein the score card comprises a microprocessor with arithmetic registers, a user interface with display device and a keyboard device, together with a memory device, wherein the user interface and the memory device respectively are connected to the microprocessor via data buses, and wherein the score card further comprises a power supply unit and a clock, and wherein the recording and monitoring system is assigned to a specific golf club and golf course and localized in connection with the golf course.

When playing golf, player data and data concerning the game are recorded in a so-called score card which is personal to the player and is used during the course of play to record the number of strokes for each hole. The play data from the score card are then used for recording a completed game and for calculating the player's points or adjusted handicap after a game is completed. Manual score cards are normally made of cardboard and have to be filled out by the player, which causes problems for a great many golf players.

So-called electronic score cards are known, usually in the form of calculator-like devices with a keyboard and display for recording play data.

Such electronic score cards are known from, e.g., WO90/03204 which discloses a programmable electronic recording apparatus for golf, based on a programmable pocket calculator, and which can be connected to an external

data processing device for printing out or recording play data after the game, and from GB 2 243 302A which discloses a score card which can be connected to a host computer and is used to record play data and results during the course of a game. None of these known score cards, however, permits an instant adjustment of the player's handicap and they are also relatively cumbersome to use. The score card which is disclosed in WO90/03204, e.g., has to be reprogrammed in a complicated manner every time the player plays on a new course.

In US-PS No. 5 127 044 there is disclosed an electronic scoring system for golf, which system includes a scoring subsystem, which is installed, e.g., in a golf cart or is carried on the golf course and is used for recording play data, together with a handicap subsystem which is located, e.g., at a fixed point and finally a portable data memory device which is used for transferring data between the scoring subsystem and the handicap subsystem. This system is highly comprehensive and complicated and its primary object is to rationalize the running of the golf course and not to cover the players' immediate requirements for recording play data and calculating and adjusting their personal handicaps. In addition the system according to US-PS No. 5 127 044 is expensive.

Finally, there is in US 4 910 677 disclosed a golf score recording system and network. In this system a plurality of local master computers are used, receiving and transferring golf related information via cartridges from and to mobile modules. The modules present a picture of the golf course on a screen and are receiving scoring data from the players.

Thus the object of the present invention is to provide a personal golf performance system for simple recording of player data as well as the performances during a game of golf, the personal performance system permitting an instant update to be performed of the player's handicap after the end of the game on the basis of play data and data recorded in the personal performance system concerning the golf course where the game takes place. A second object is that the personal performance system should be simple to program, and that the information contained in the personal performance system or generated thereby can be transferred by simple means to a suitable recording and monitoring system in connection with the golf course.

Consequently a further object is to provide a recording and monitoring system of this type which is compatible with the personal performance system.

It is a further object to simplify the use of the personal performance system and ensure that the personal performance system in connection with the golf  
5 game is implemented as a temporary subsystem in the recording and monitoring system, thus enabling it to record results of play, data concerning the player and adjust and confirm the player's handicap.

Finally, yet another object of the present invention is to provide a method in connection with the use of a personal performance system according to the  
10 invention together with a recording and monitoring system according to the invention.

These above-mentioned objects are achieved with a personal performance system which according to the invention is characterized in that the personal performance system comprises a separate, personal data module, that the  
15 display device in the user interface comprises a first display for display of a first player's handicap, a second display for display of a second player's handicap, a third display for display of information and menus, and a fourth display for display of fixed or variable data during an ongoing game of golf, the fixed data being composed of parameters for the course on which the  
20 game is being played and the variable data being composed of the number of strokes and points together with summations of the variable data, that the keyboard device in the user interface comprises a first function key for the first player, a second function key for the second player, the first and second function keys influencing the display of information in the first and second  
25 displays respectively, a menu key for display of menu information in the third display, arrow keys for moving a cursor in the fourth display, +/- keys for altering displayed numbers and selecting an indicated object shown in the menu of the third display, and an enter key for entering input and altered numbers and data shown in the displays, an input/output interface for  
30 connecting the score card to the personal data module which is separate and releasable from the score card, for transfer of data between the score card and external data processing devices, the personal data module being arranged for storage of the data which have to be transferred, and to be read and written by both the score card and external data processing devices respectively, and

thereby store information on the golf course, at least one player and the results of the game;

a recording and monitoring system which according to the invention is characterized in that the recording and monitoring system comprises a central  
5 data processing device which comprises a processor, a data storage device and a serial interface for the input and reading out of data, an input/output interface for reading and writing to and from the personal performance system, the data processing device being localized in connection with the golf course or golf club and specific to the golf course and/or the golf club and  
10 arranged to store information on the golf course, the club's players, non-members and completed golf games in a database generated in the data processing device and stored in the data storage device, which database is updated with information on completed games and the players' performances via the serial interface or input/output interface, together with the processor,  
15 and on the basis of the performances calculates the points and handicaps for the players, and is also arranged to issue specific information on a player registered in the database to the personal performance system which stores this information and correspondingly stores information generated by the player's personal performance system for transfer to the data processing  
20 device for use in updating the database;  
and finally with a method according to the invention which is characterized in that the method comprises steps for inputting player data into the personal performance system for a first player and possibly also a second player, for registering the player or players in the recording and monitoring system's  
25 central performance system by reading thereinto from the personal performance system, for inputting data into the personal performance system for a golf course where a game of golf is about to be started by the player or players, these data being retrieved from a database provided in the recording and monitoring system, for recording in the personal performance system  
30 during the course of the game of golf, the number of strokes for each hole for the first and possibly the second player, the personal performance system calculating points for the player or players for each hole, whereupon after the game has been completed, the personal performance system automatically adds up variable play data as a number of strokes and points for the player or  
35 players and calculates the adjusted handicaps for the player or players taking into account the playing system used, and thereupon transferring the first player's and possibly the second player's data with adjusted handicaps to a data processing device arranged in the recording and monitoring system for

recording the completed game and updating the database with adjusted data for results of play, and the first and possibly the second player's adjusted personal handicap.

5 The invention will now be described in more detail in connection with preferred embodiments and by way of example, with reference to the accompanying drawing, in which:

figure 1 illustrates the design of the electronic score card which forms part of the personal performance system according to the invention;

10 figure 2 is a block diagram of the electronic components in a design of the personal performance system according to the invention;

figure 3 illustrates a design of a display device for the electronic score card which forms part of the personal performance system according to the invention; and

15 figure 4 is a schematic layout of the recording and monitoring system according to the invention.

20 Figure 1 illustrates the appearance of an electronic score card 1 which forms part of the personal performance system PGPS according to the invention. In reality the electronic score card 1 constitutes a user interface to a computer system which stores information on the players and the result of the game and uses the result of the game together with known data for the golf course where the game was played to calculate points and adjust the players' handicaps. All information can be displayed on a display device D which forms part of the user interface and, as illustrated in figure 1, comprises four separate displays D1-D4. In addition the user interface also includes a very  
25 simple keyboard device T with a number of keys whose function will be described in more detail below. - It should, however, be noted that the illustration in fig. 1 is intended as exemplary only, as the actual layout of the displays and the keyboard may differ between different models of the score card.

30 The electronic score card 1 also comprises at least one input/output interface 4 for a personal data module 10 which in the preferred embodiment is



implemented as an electronic smart card. This smart card can be inserted into an input/output interface 4 in the form of a card reader which is provided in the electronic score card, this being used for transferring information to and from the score card when personal data modules are employed. In addition  
5 the electronic score card can be equipped with an additional input/output interface 9 for transferring information between the score card 1 and an external data device such as a PC. This will be discussed in more detail below.

10 The electronic score card 1 comprises a number of electronic components which are preferably implemented on a printed circuit board provided in the score card.

Figure 2 is a functional block diagram for the score card's electronic components and their interconnection. The core of the score card 1 is a microprocessor 2 which is connected to a memory device 3 via a serial data bus B1. In a preferred embodiment the memory device 3 can include an  
15 EEPROM for storing static data, such as the player's name, address, club and membership number. In practice the player, i.e. the owner of the score card, can also enter data for several clubs in EEPROM. The data of the player in question are also stored in EEPROM and it can also store texts for display on  
20 the display device D. This is practical if the language used by the score card in menus and background texts has to be changed. Moreover, the memory device comprises one or more RAMs where data for a relevant golf game are stored. Play data for the score card's owner and possibly a second player (partner or marker) are stored and points and number of strokes are calculated  
25 and stored in the RAM by means of the microprocessor. The serial data bus B1 is preferably a serial data bus of the type IIC. A corresponding data bus B2 is connected to an input/output interface 4 for transferring data to and from the personal data module 10 which in a preferred embodiment is a programmable data module.

30 In the design illustrated in figure 2 the input/output interface 4 is implemented as a card reader and the personal data module 10 as an electronic smart card. It should be understood that the data buses B1 and B2 can be one and the same data bus if, e.g., a serial data bus of type IIC is used for both the memory device 3 and the input/output interface or the card  
35 reader 4.

Furthermore the display device D is connected to the microprocessor 2 via a display interface 11 and a standard 8-bit data bus B3 and the keyboard device is connected to the microprocessor via a keyboard interface 12 and a 4-bit matrix bus B4. An additional input/output interface 9 can also be provided  
5 which is connected to the microprocessor 2 and is preferably a serial interface of type RS-232C which enables data to be transferred directly between the score card and an external data device. This interface 9 can be implemented as a not shown edge connector or plug contact on the score card 1. The score card is supplied with power from a combined battery/charging unit 5, and it  
10 should be understood that the battery/charging unit of course can be connected to an external power source for charging the battery. An analog line 6 transfers data for the battery capacity to an analog/digital converter 7 which is also connected to the microprocessor 2 via an 8-bit data bus B3. The microprocessor further includes a clock 8 which can indicate both date and  
15 time. It should be understood that both the analog/digital converter 7 and the clock 8 can be integrated in the microprocessor. Via the microprocessor 2 the battery's capacity and a warning with regard to charging can be displayed in the display device D as can the date and time as indicated by the clock 8. The clock can be supplied with a stopwatch function via the keyboard device T  
20 and the display device D and in addition will automatically record the date and time for the start and end of a game of golf.

The personal data module 10, which in the preferred embodiment is an electronic smart card, contains information on the course and the course's handicap and indicates whether a "course rate" system or a "slope" system is  
25 employed. The smart card which is personal to each player also contains information on the player's handicap and personal information such as his name, address and possibly his membership number in the golf club. After the end of the game, moreover, the smart card will automatically have the result of play transferred and finally also have the handicap calculated and adjusted  
30 from the microprocessor.

The display device D is illustrated in more detail in figure 3 and will be discussed in connection with this and figure 1. The first display D1 is arranged to display the handicap for a first player and also indicates which system of play is used. The second display D2 corresponds to display D1, but  
35 displays the handicap for a second player and which system of play is used. Display D3 is an information display for display of information, such as

menus, error messages, date, time, etc. D4 is the main display which displays the progress of an ongoing game of golf. As illustrated in figure 1, the main display D4 can be supplied with background texts as in a top part D4a for displaying information on the play for the first and second players, and in the design shown in figure 1 arranged to display the performances for up to 9 holes at a time. These figures are placed on the far left of the display D4 in figure 1. The background texts for each of the players in D4a indicate parameters for the golf course, the number of strokes taken for each hole and points calculated on the basis of the player's handicap, the par and handicap for the course and number of strokes taken respectively. It should be understood that the points will also depend on a parameter for the system of play which is employed, i.e. either the course rate system or the slope system. The same applies to the background texts for a second player, these being placed in the top part D4a on the right of the display D4 and physically separated from the background texts for the first player, thus enabling them to be displayed simultaneously. The bottom part D4b of the main display D4 can display summations of variable play data and these are indicated by background texts on the far left and at the bottom of the display.

As illustrated in figure 3, the displays D1-D4 in the display device D are connected to the microprocessor 2 via the 8-bit data bus B3 and the display interface 11, as is also illustrated in figure 2.

The display device D forms a first part of the user interface in the personal score card 1. The second part of the user interface is composed of the keyboard device T which is illustrated in more detail in figure 1 and comprises a first function key T1 which activates the display D1 and places a cursor in this display. It will then be possible to change parameters concerning a first player with a plus key T5 or a minus key T6 respectively. When the desired value has been reached, an enter key T4 is pressed and the value displayed in the display D1 is stored in the score card's memory device 3. In this fashion the handicap, e.g., can be adjusted. T2 has the same function as the function key T1, but activates the display D2 for a second player. The menu key T3 activates the information display D3 and makes it possible to gain access to a menu programme stored in the score card which is displayed in the display D3. By using the plus/minus keys T5, T6, objects can be selected from the menu. Typical menu objects may, e.g., be as follows:

1. Change name/membership number/course
2. Indicate system of play
3. Set clock/Reset clock/Stopwatch
4. Current measurement/Charging
- 5 5. Start of golf game/Continue the game
6. Display message
7. Display fairway

Finally four arrow keys A1-A4 are provided, which are used to move a cursor between positions in the main display D4. When a position is selected in the main display D4 with the arrow keys, it will be possible to change a number which is placed in this position by pressing one of the keys T5, T6, the plus key increasing the number by 1 and the minus key reducing it by 1.

As illustrated in fig. 2, the keyboard device T is connected to the microprocessor 2 via the keyboard interface 12.

15 As illustrated in figures 1 and 2 the electronic score card 1 comprises an input/output interface 4 for a personal data module 10. The personal data module 10 is preferably a smart card and the input/output interface 4 is thereby a card reader. In reality the card reader 4 will establish an additional key function, since by entering and pressing the keys T1 and T2 respectively  
20 the information stored in the smart card will lead to data for the player to whom the smart card is assigned being read and stored in the electronic score card's memory device 3. Any previously stored data on the player in the smart card's memory device 3 will be updated simultaneously. A personal data module can also be used for the second player, but in this case the  
25 person concerned has to enter via the user interface D, T a personal PIN code which acts as an acknowledgment, since it should be understood that the electronic score card is basically personal and assigned to one player, even though it is possible for two players to use it during a game. A release key T7 is provided on the score card 1 and is pressed when the smart card has to  
30 be removed from the card reader 4.

After the data have been entered and read in the personal data module 10, the game can start and the only thing the player now needs to do is to record the number of strokes taken for each hole. At the first hole, e.g., the cursor will be placed below the background text "score" for one of the players and the

number will be 0. By using the plus key T5 the number can be altered until it equals the number of strokes the player has taken to get the ball into the hole. When the correct number is displayed, this is stored by means of the enter key T4. If there are two players, the cursor will move to the same position  
5 for the second player and the procedure is repeated. When all the strokes for the first hole have been recorded, the cursor moves automatically one line down to the position for the performance or score for the first player. This continues until the entire game has been completed and the player or players' performances for all the holes have thereby been recorded.

10 Alphanumeric information can be entered into the score card's memory device via the user interface D, T by means of, e.g., the arrow keys A1-A4, the plus/minus keys T5, T6 and the enter key T4. Alphanumeric symbols will be displayed in groups, sequentially or individually in, e.g., the information  
15 display D3 by means of the arrow keys or the plus/minus keys and input with the enter key T4 when the cursor is positioned at the correct symbol.

The course information which is stored in the smart card 10 can comprise graphic information in the form of maps showing the fairway for each individual hole. The fairway map for a hole can be selected from the menu and displayed on the main display D4. It will be able to indicate the distance  
20 between the tee and the green, differences in level, par for the hole and degree of difficulty as well as obstacles. During the course of play the fairway map for the hole in question can also be displayed in the main display, e.g. by pressing the menu key T3 when the cursor is positioned at this hole's number. The fairway map for the hole then appears on the main  
25 display. At the same time the strokes can also be recorded with the plus key T5 and after entering they can be displayed overlaid on the fairway map. By pressing the menu key T4 the fairway map will be removed from the display, while the number of strokes will naturally remain under "score" for the hole.

30 It should be understood that the display device D can be implemented, e.g., with specially designed LCD displays or plasma displays. All functions in connection with the user interface and the display and processing of information are generated by specially developed software for the personal performance system stored in the memory device.

Figure 4 is a schematic representation of a recording and monitoring system RMS for golf. The system comprises the personal performance system PGPS which is for one player's own personal use, but which, as stated above, can deal with up to two players simultaneously. The personal performance system PGPS comprises the electronic score card 2 with input/output interface 4;9 and a personal data module 10, preferably implemented as an electronic smart card. The electronic smart card 10 constitutes a component which can be connected to and separated from the electronic score card 2, depending on whether or not a game is in progress, or whether data have to be transferred between the electronic score card 2 and another part of the recording and monitoring system, described in figure 2 as CGPS. CGPS comprises an input/output interface 13 and connected to the input/output interface 13 is a data processing device 15 which can be a personal computer PC, this personal computer being connected to peripheral units such as a floppy disk unit 16 or a printer 17 for generating hard copies. Unlike PGPS, CGPS is not personal, but assigned to a specific golf club and golf course and preferably localized in connection with the golf course, e.g. in the clubhouse. The data processing device 15 is connected to a serial interface 14, e.g. of type RS-232C and the input/output interface 13 which in the present case is preferably a card reader for reading and writing from the electronic smart card 10 which preferably constitutes the personal data module. Furthermore the data processing device 15 is connected to peripheral units such as a floppy disk unit 16 and a paper printer 17, and at the player's option can also be connected to other data processing devices. The data processing device 15 contains in a not shown memory a database which stores information on the golf course, the club's players, non-members and completed golf games. This database can be updated with information which, e.g., is entered in the personal data module or the smart card 10, but also via input/output peripheral units (not shown) which are connected to the data processing device 15 for updating of the database and programming of the data processing device 15. The data processing device 15 further stores software which can implement updating and is used for calculating points and handicaps for the players. Information on a player registered in the database can be transferred to the personal performance system PGPS, i.e. the smart card 10 and via this on to the memory device 3 (figure 2) in the electronic score card 1. Moreover information which is generated by the player's personal performance system PGPS can be transferred in a similar manner to the data processing device 15 and used for updating of the database. Adjusted handicaps after the end of a

game can be calculated in the personal performance system PGPS, but are also calculated and at least checked in the performance system CGPS of the recording and monitoring system RMS.

A method will now be discussed for use with the personal performance system PGPS and its central performance system CGPS. On arrival at the golf club or golf course, when registering in the recording and monitoring system which is assigned to the course or club and preferably placed in the clubhouse, the player will simultaneously receive the personal data module 10 which is updated with the player's name, handicap, etc. if the player is already a member of the club. If a new personal handicap for the player is already recorded in the player's score card which is not found in the CGPS, the database in the data processing device 13 can be simultaneously updated with the correct handicap. As mentioned above, the personal data module 10 is preferably a smart card and data are read from the CGPS to this smart card via the input/output interface 13 which in this case is a card reader. The player can then insert the smart card 10 into his personal electronic score card 1 and press the key T1, whereupon all the data on the player and the golf course which are in the smart card 10 are input into the memory in the score card 1. If there is a partner or marker, he can now acquire his personal smart card and perform the same procedure. By pressing the key T2 on the score card 1 of the first player, the partner's smart card can transfer the data on him/her to the first player's electronic score card 1. This requires the second player (partner or marker) to key in a PIN code in the first player's electronic score card. Such PIN codes are to be found in all personal data modules or smart cards 10. The PIN code is keyed in on the display D3 where after pressing P2 four figures will appear which can be altered to the correct PIN code by means of the plus/minus keys T5, T6 and the arrow keys A1-A4. By then pressing the enter key T4 the input PIN code will be confirmed against the PIN code which is in the player's smart card.

The golf game can now begin, and, as mentioned previously, each hole appears in turn on the main display D4. The relevant player presses the plus key T5 for each stroke performed at this hole, and when the ball has landed in the hole, the enter key T4 has to be pressed in addition to the plus key in order to confirm that the hole in question has been completed, whereupon the cursor on the display D4 moves to the position for the next hole. If the score card is used again for two players, this naturally occurs after the partner is

finished. It is preferred that a maximum of nine holes should be able to be displayed at a time on the display D4. After play is completed on the first nine holes and the results added up, holes 10-18 will appear on the display. It is entirely possible to return to previously played holes by using the arrow keys A1-A4. As mentioned above, in connection with and during play a map of the fairway for a hole can be displayed on the main display D4, showing obstacles, levels and the distance between tee and green. In connection with these operations the electronic score card adds up all variable play data in the correct columns, regardless of the type of competition, and when a game is over, calculates points and adjusted handicaps for the players. When a game is over, the player keeps the plus key T5 depressed while at the same time pressing function key T1. The electronic score card 1 then performs the necessary calculations and all the data from the score card are simultaneously transferred to the personal data module or smart card 10. If there is a partner, he must press the key T2 at the same time as the minus key T6. At the same time the score card 1 also performs an automatic check in order to ascertain whether the smart card(s) to which the data have to be transferred are valid. The smart card 10 is now removed from the electronic score card 1 and can be handed to the golf club's secretariat for recording. This is done by inserting the smart card 10 into the card reader 13 in the CGPS. The information stored in the smart card 10 is transferred to the data processing device 15 and checked, possibly with a check of the calculation of the adjusted handicap, and a new updating of the smart card 10 with corrected and confirmed data may be performed. The partner's card, of course, undergoes the same procedure. The electronic score card 1 can be simultaneously updated with the player's confirmed and adjusted handicap by reinserting the smart card 10 in the interface 4 and having it read by the electronic score card 1. In connection with the recording after the completion of a game, a hard copy is printed out by the data processing device 15 on the printer 17. This is signed by the player and possibly by his partner.

The personal data module or smart card 10 shall in one version as intended be valid only for the golf club or golf course concerned, and, even though it is a personal data module, it is unambiguously associated with the recording and monitoring system RMS. When it is not being used by the player, therefore, the personal data module or smart card 10 will be kept in connection with the CGPS, i.e. in practice in the golf club's secretariat. If the player plays on another course or in another golf club, a new personal data



module or smart card 10 thus has to be generated for this course, but it can be used in the same manner, and thus it will not be necessary to reprogramme the score card 1, since all the relevant data transferred from the new smart card 10 will result in the necessary updating of the information stored in the electronic score card 1. In reality, therefore, a personal data module or smart card 10 virtually lasts forever and will only be issued to the player every time he plays a game of golf on the course to which the personal data module 10 is unambiguously assigned.

However, it is also possible to envisage a version of the personal data module or smart card being personal in strict sense. In this version the personal data module or smart card 10 is issued once and for all to its holder or owner with the owner's personal data, identification and authorization codes, together with the necessary functional and non-changeable software and then carried by the owner, e.g. together with score-card 1 and used whenever and wherever the owner plays. In connection with the performance system PGPS and CGPS the personal data module or smart card 10 is used as before, but is read and receives the relevant input data when the owner registers at the golf course, be it his own club or a different club. In each case the relevant information about the golf course and the handicap system used is downloaded to the personal data module or smart card 10 from the in-house performance system CGPS and transferred to the owner's electronic score card 1 before the game commences. After a finished game the results, including scores and revised handicap, is transferred to the central performance system CGPS of the club, updating the recording and monitoring system RMS of the club, which results are retained in the personal data module or the smart card 10 and possibly also the score card 1 for later use, either on the same or another golf course. This version of the personal data module or smart card 10 thus offers the possibility of always making the latest data of the player's performance available to the recording and monitoring system RMS in question and thus also ensures an update of the system with the correct performance data, whenever the holder of the personal data module or smart card 10 registers for a game.

In the above description the personal data module 10 is preferably physically implemented in the form of an electronic smart card. However, it is also possible to implement the personal data module in the form of a non-physical object, viz. a program module. Thus in practice the program module

represents what can be described as a virtual smart card or a virtual personal data module 10. This assumes that the implementation in the form of a personal program module exists in the electronic score card 1 and the data processing device 15 respectively in CGPS. Instead of being issued with the smart card during registration before the game starts, the electronic score card 1 is inserted into an input/output interface, for example the serial interface 14, thus connecting it to a compatible serial interface 9 in the electronic score card. The information is now transferred as in the case of the smart card 10, but this time in the form of information from a personal program module stored in the data processing device 15 and to a corresponding personal program module stored in the memory device 3 in the electronic score card 1, the personal program modules constituting a mutually unambiguous image of each other. If the personal data module 10 is implemented in a non-physical form of such a program module, the card readers 4 and 13 can naturally be dispensed with, the electronic score card 2 thus comprising only a serial interface 9 and CGPS corresponding to a serial interface 14 which can preferably be an interface of type RS-232C. The serial interface 9 on the electronic smart card 10 can also be connected to an external data processing device, e.g. the player's own personal computer and used for entering personal data via the keyboard of this computer, which will be simpler than using the user interface D,T in the electronic score card 1 for this purpose. Similarly, data stored in the memory device 3 in the personal score card 1 can naturally be read to such an external data processing device via the interface 9. In this case the interface 9 can be implemented as either a not shown plug contact on the electronic score card 1 or also as a not shown edge connector on the score card 1. However, it is preferable that both the electronic score card 1 and the central performance system CGPS of the recording and monitoring system RMS should be implemented with input/output interfaces 4;11 in the form of card readers, in addition to the serial interfaces 9;14 for connection to data processing devices.

There are many contexts in which it is preferable to implement the personal data module 10 in the form of an electronic smart card. In fact this can also be designed as a carrier of advertisements or information which are not necessarily directly connected with golf, but which nevertheless could have a powerful influence, in the light of the already great and steadily growing popularity of golf. In reality, therefore, the personal performance system PGPS will be provided with options for choice of personal data module, nor

is there any reason why it cannot be physically implemented in a different manner than as a card, e.g. as a module which can be plugged into the electronic score card 1, and then the connectable module can naturally be removed from the score card and when data are recorded or read to CGPS it  
5 can be inserted into a compatible plug interface in this system.

In addition to the information which is necessary for the game and is stored in the personal data module or smart card 10, it can also contain messages which are entered by CGPS during registration. These messages can be personal or impersonal, e.g. general information from the golf club, bargain  
10 offers, tournament calendars, etc. and will be communicated to the player when the information in the personal data module 10 is entered into the score card, e.g. by means of a blinking menu display. Thus by means of the menu key T3 messages of this kind can be retrieved and displayed, e.g. in the main display D4.

15 It will be evident to a person skilled in the art that a number of variations are possible both with regard to the design of the personal performance system CPGS and the recording and monitoring system RMS according to the present invention and within the scope of the attached claims. However, regardless of the specific design chosen, it is clear that with the personal performance  
20 system PGPS and recording and monitoring system RMS according to the present invention, together with the use of the indicated method, compared to other known systems it will be much simpler for the player to keep a check on his results and at the same time it will entail substantial savings for the golf club with regard to time and expenses, not least with the automatic  
25 recording of adjusted handicaps for the golf club's members. Both the personal performance system PGPS and the recording and monitoring system RMS are implemented with relatively simple electronic equipment, only the user interface, i.e. the display and keyboard devices D,T, being peculiar to the system. All the other components will mainly be standard components which  
30 are available on the market, thus enabling the invention as a whole to be implemented with a minimum of expenses for both club and players.

## CLAIMS

1. A personal golf performance system, comprising a hand-held, programmable electronic score  
 5 card (1), wherein the score card (1) comprises a microprocessor (2) with arithmetic registers, a user  
 interface (D, T) with a display device (D) and a keyboard device (T) including keys for entering  
 data for the players, together with a memory device (3), wherein the user interface (D, T) and the  
 memory device (3) are connected respectively to microprocessors via data buses (B1, B2, B4), and  
 wherein the score card (1) further includes a power supply unit (5) and a clock (8) and an insert for  
 10 an external data transfer device, wherein the personal performance system (PGPS) comprises a  
 separate, personal data module (10) which can be connected to the score card (1) or separated  
 therefrom, characterized in that the display device (D) in the user interface (D, T) comprises a first  
 display (D1) for display of a first player's handicap, a second display (D2) for display of a second  
 player's handicap, a third display (D3) for display of information and menus, and a fourth display  
 15 (D4) for display of fixed or variable data during an ongoing game of golf, the fixed data being  
 composed of parameters for the course on which the game is being played and the variable data  
 being composed of the number of strokes and points together with summations of the variable data,  
 that the keyboard device (T) in the user interface (D, T) comprises a first function key (T) for the  
 first player, a second function key (T2) for the second player, the first and second function keys  
 20 (T1, T2) influencing the display of information in the first and second displays (D1, D2)  
 respectively, a menu key (T3) for display of menu information in the third display (D3), arrow keys  
 (A1, A2, A3, A4) for moving a cursor in the fourth display (D4), +/- keys (T5, T6) for altering  
 displayed numbers and selecting an indicated object shown in the menu of the third display (D3),  
 and an enter key (T4) for entering input and altered numbers and data shown in the displays, an  
 25 input/output interface (4) for connecting the score card (1) to the personal data module (10) which  
 is separate and releasable from the score card, for transfer of data between the score card and  
 external data processing devices, the personal data module (10) being arranged for storage of the  
 data which have to be transferred, and to be read and written by both the score card and external  
 data processing devices respectively, and thereby store information on the golf course, at least one  
 30 player and the results of the game.

2. A personal performance system according to claim 1, characterized in that the memory device (3) comprises an EEPROM for storing static player data and texts for display on the display device (D).

3. A personal performance system according to claim 2, characterized in that the memory device (3) comprises one or more RAM for storage of data concerning an ongoing game, the game data being transferred after the end of the game to the personal data module (10).

4. A personal performance system according to claim 1, characterized in that the memory device (3) comprises a backup power supply unit for RAM.

5. A personal performance system according to claim 1, characterized in that the memory device (3) and the input/output interface (4) are connected to the microprocessor (2) via an IIC bus.

6. A personal performance system according to claim 1, characterized in that the display device is connected to the microprocessor via a display interface (11) and an 8-bit data bus (B3).

7. A personal performance system according to claim 1, characterized in that the keyboard device (T) is connected to the microprocessor (2) via a keyboard interface (12) and a matrix bus (B4).

8. A personal performance system according to claim 1, characterized in that a second input/output interface (9) is provided in the form of a serial interface for connecting the score card (1) to a data processing device.

9. A personal performance system according to claim 8, characterized in that the serial interface (9) is an RS-232 interface.

10. A personal performance system according to claim 1, characterized in that the power supply unit (5) comprises a battery and a charging unit for the battery, the power supply unit on an analog line (6) being connected to an analog/digital converter (7) which acts as a battery tester and via an

8-bit data bus (B3) supplies information on the battery capacity and charging condition to the microprocessor (2) for display in the third display (D3).

11. A personal performance system according to claim 10, characterized in that the analog/digital converter (7) and the clock (8) are integrated in the microprocessor.

12. A personal performance system according to claim 1, characterized in that the personal data module (10) is a programmable data module.

13. A personal performance system according to claim 1 or claim 12, characterized in that the personal data module (10) is physically implemented as an electronic smart card with a separate read/write memory for the data which have to be transferred.

14. A personal performance system according to claim 13, characterized in that the input/output interface (4) is a card reader.

15. A personal performance system according to claim 1 or claim 12, characterized in that the personal data module (10) is physically implemented as a plug module.

16. A personal performance system according to claim 1, characterized in that the personal data module (10) is non-physically implemented as a program module for storing in the score card's memory device (3), one part of the program module (10) being generated in the score card (1) and a second part being transferred from an external data processing device to the memory device (3) in the score card (1).

17. A personal performance system according to claim 15 or 16, characterized in that the input/output interface (4) is a serial interface.

18. A recording and monitoring system for golf with a central performance system (CPGS), wherein a personal golf performance system (PGRS) according to one of the claims 1-15 is employed and wherein the recording and monitoring system (RMS) is assigned to a specific golf club and golf course and localized in connection with the golf course, characterized in that the

recording and monitoring system (RMS) comprises a central data processing device (15) which includes a processor, a data storage device and a serial interface (14) for the input and reading out of data, an input/output interface (13) for reading and writing to and from the personal performance system (PGPS), the data processing device being localized in connection with the golf course or golf club and specific to the golf course and/or the golf club and arranged to store information on the golf course, the club's players, non-members and completed golf games in a database generated in the data processing device (15) and stored in the data storage device, which database is updated with information on completed games and the players' performances via the serial interface (14) or input/output interface (13), and the processor, and on the basis of the performances calculates the points and handicaps for the players, and is also arranged to issue specific information on a player registered in the database to the personal performance system (PGPS) which stores this information and correspondingly stores information generated by the player's personal performance system (PGPS) for transfer to the data processing device (15) for use in updating the database.

19. A recording and monitoring system according to claim 18, wherein a personal data module (10) is employed for transfer of data between the central data processing device (15) and the personal performance system (PGPS), characterized in that the personal data module (10) is an electronic smart card, and that the input/output interface (13) is a card reader connected to the data processing device (15).

20. A recording and monitoring system according to claim 18, wherein a personal data module (10) is employed for transfer of data between the central data processing device (15) and the personal performance system (PGPS), characterized in that the personal data module (10) is implemented as a program module, one part of which is stored in the data processing device (15) and transferred to the personal performance system (PGPS) and a second part is generated by the personal performance system (PGPS), and that the input/output interface (14) is implemented as a serial interface for direct connection of the electronic score card (1) which forms a part of the personal performance system (PGPS).

21. A recording and monitoring system according to claim 18, characterized in that the central data processing device (15) is a personal computer.

22. A recording and monitoring system according to claim 18, characterized in that the central data processing device (15) is connected to a printer (17) for the generation of print-outs concerning completed games, and information on the players, including results of play, points and handicaps.

5

23. A method in connection with a recording and monitoring system (RMS) for golf, with a central performance system (CGPS), wherein there is employed a personal performance system, comprising a hand-held, programmable electronic score card (1), wherein the score card (1) comprises a microprocessor (3) with arithmetic registers, a user interface (D, T) with display  
10 device (D) and a keyboard device (T), together with a memory device (3), wherein the user interface (D, T) and the memory device (3) respectively are connected to the microprocessor (2) via data buses (B1, B2, B3), wherein the score card (1) further comprises a power supply unit (5) and a clock (8), and wherein the recording and monitoring system (RMS) is assigned to a specific golf club and golf course and localized in connection with the golf course, characterized in that the  
15 method comprises steps for inputting player data into the personal performance system for a first player and possibly also a second player, for registering the player or players in the recording and monitoring system's central performance system by reading thereinto from the personal performance system, for inputting data into the personal performance system for a golf course where a game of golf is about to be started by the player or players, these data being retrieved from  
20 a database provided in the recording and monitoring system, for recording in the personal performance system during the course of the game of golf, the number of strokes for each hole for the first and possibly the second player, the personal performance system calculating points for the player or players for each hole, whereupon after the game has been completed, the personal performance system automatically adds up variable play data as a number of strokes and points for  
25 the player or players and calculates the adjusted handicap for the player or players taking into account the playing system used, and thereupon transferring the first player's and possibly the second player's data with adjusted handicap to a data processing device arranged in the recording and monitoring system for recording the completed game and updating the database with data for results of play, points and the first and possibly the second player's adjusted personal handicap.

30

24. A method according to claim 23 characterized in that player data is input to the personal performance system via a user interface provided therein.



25. A method according to claim 23, characterized in that player data is input to the personal performance system via an external personal computer which is connected to the personal data system via a serial input/output interface.

5

26. A method according to claim 23, characterized in that player data are input to the personal performance system together with data for the golf course in a personal data module which belongs to the golf club and is issued to the player on payment of a fee during registration before the start of a game, the information contained in the personal data module being transferred before the start of  
10 the game from the data processing device in the recording and monitoring system to the personal performance system via a serial input/output interface in the personal performance system and the central performance system respectively in the recording and monitoring system, and that after the game is completed the contents of the personal data module are updated in the personal performance system with the variable play data, points and calculated and adjusted handicaps,  
15 whereupon the contents of the personal data module are transferred to the central performance system in the recording and monitoring system.

27. A method according to claim 23, characterized in that player data are input to the personal performance system together with data for the golf course into a program module which belongs to  
20 the player and is issued once and for all to the player on payment of a fee, the information contained in the personal data module being transferred from the data processing device in the recording and monitoring system to the personal performance system via a serial input/output interface in the central performance system in the recording and monitoring system respectively and the personal performance system, and that after the game is completed the contents of the  
25 program module are updated in the personal performance system with the variable play data, points and calculated and adjusted handicaps, whereupon the contents of the program module are transferred to the recording and monitoring system.

28. A method according to claim 26 or 27, characterized in that an electronic smart card is used  
30 as the personal data module.

29. A method according to claim 28, characterized in that a card reader is used as input/output interface in the central performance system in the recording and monitoring system and the personal performance system respectively.
- 5 30. A method according to claim 23, characterized in that the central performance system in the recording and monitoring system is connected to a printer for printing out a hard copy verification of player data, results of a completed game and on the basis of the results, points and adjusted handicaps for the player or players.

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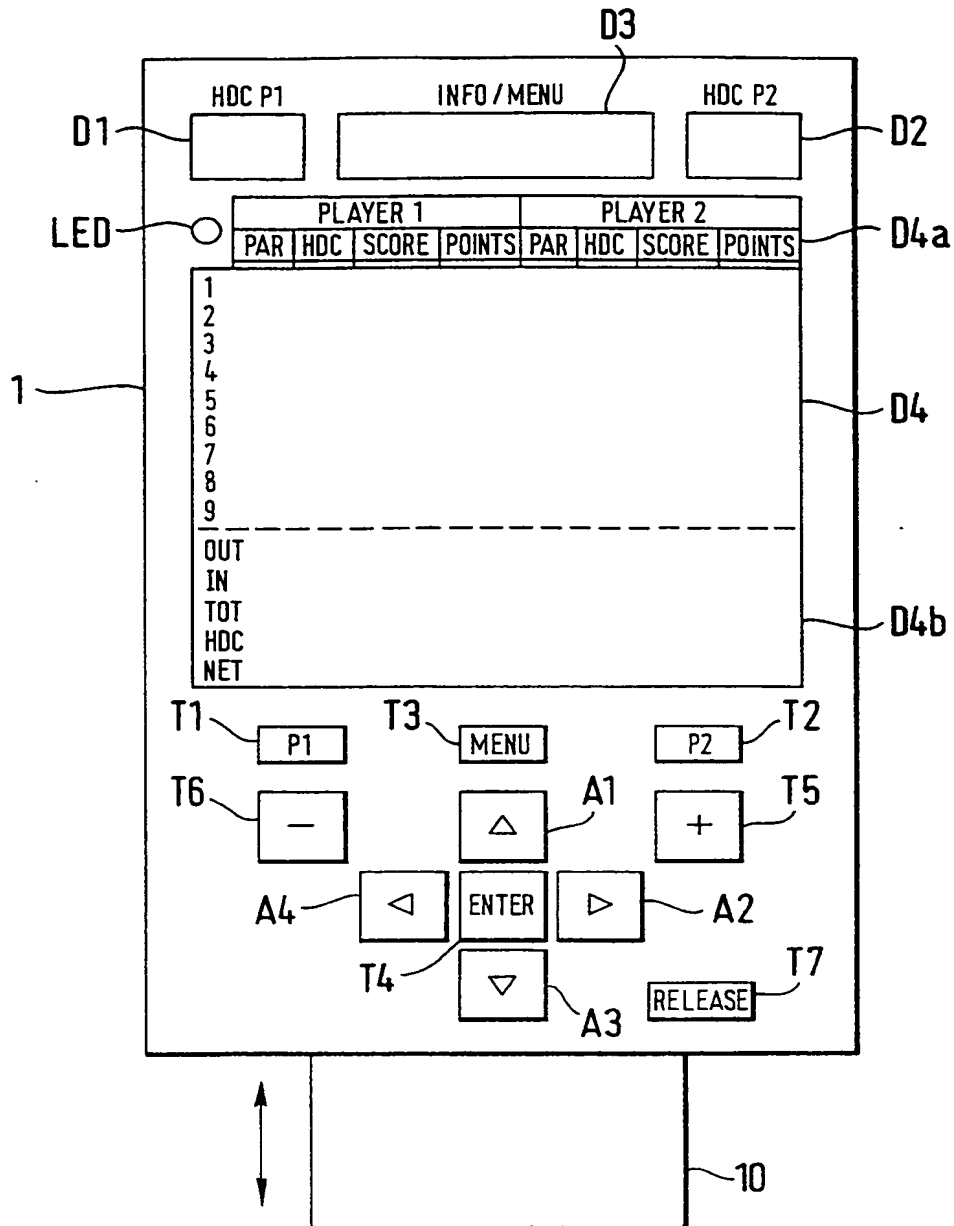
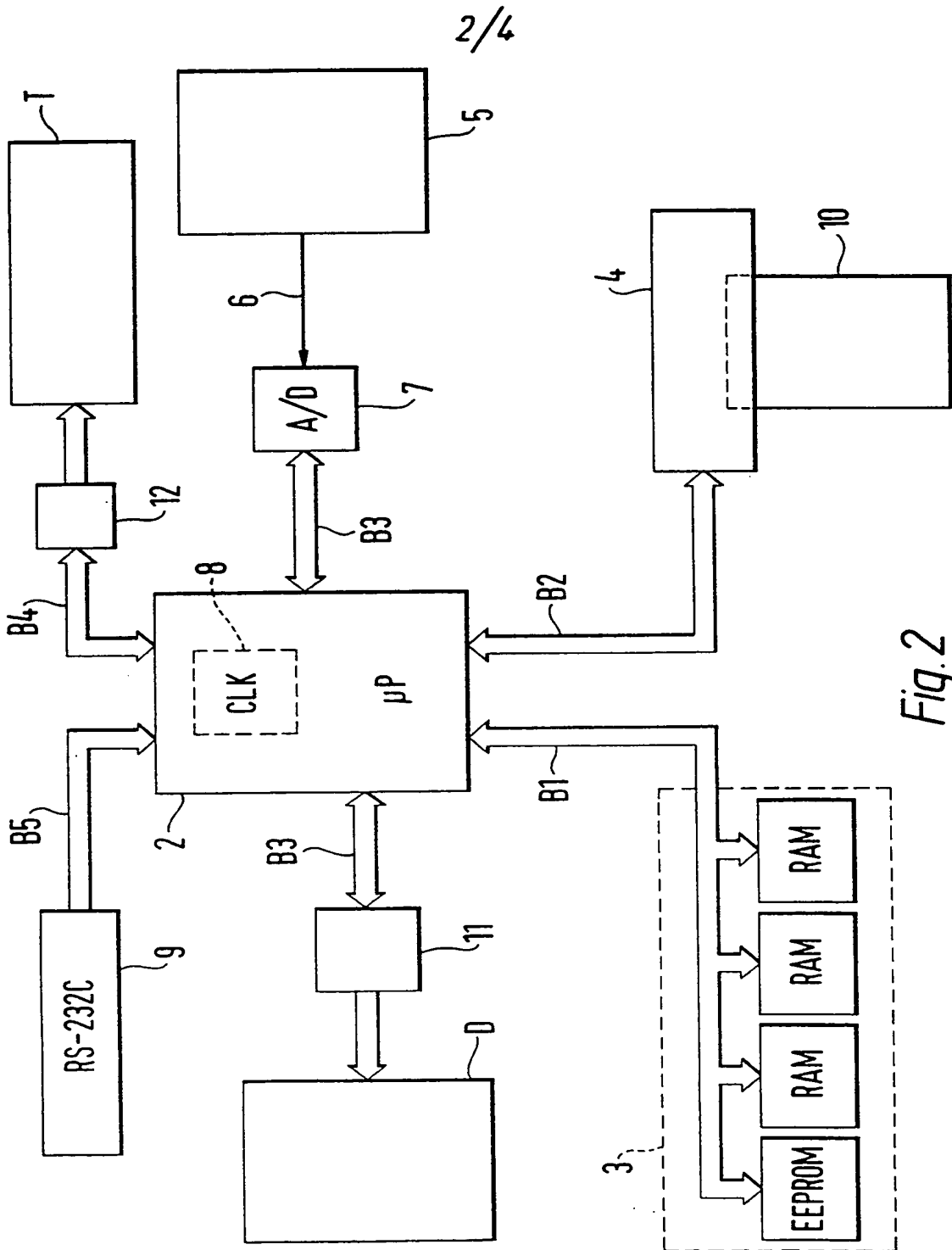


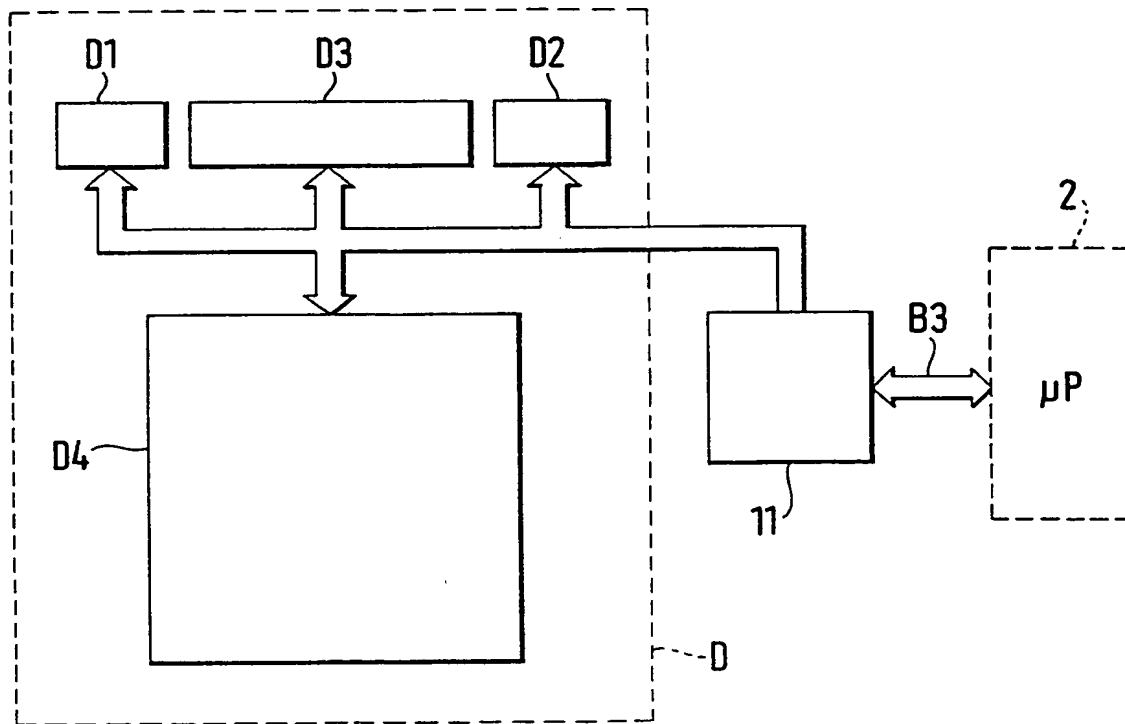
Fig. 1

PGPS

SUBSTITUTE SHEET



3/4

*Fig. 3*

4/4

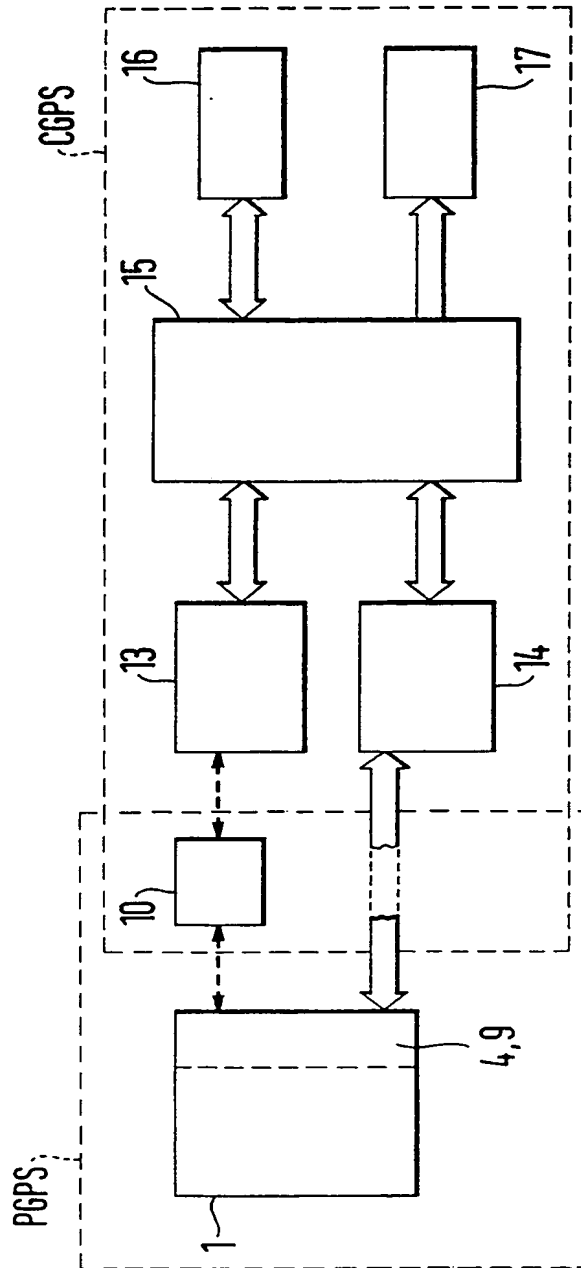


Fig.4 RMS